Muon Trigger Overview

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- **Overview of hardware activities**
- **Overview of software activities**
  – punchthrough simulation
  – update of RPC trigger acceptance
- **"Preliminary specifications of the baseline trigger algorithms"**
  – discussion of the paper

Muon Trigger Hardware

- **RPC / PACT**
  - PAC ASIC specification completed and submitted for the design
  - test bench boards produced in Bari expected this week to be sent to Warsaw for assembly
  - VHDL description of test bench well advanced
- **Drift Tubes / BTI & TC**
  - successful tests of FPGA prototype of BTI
  - analysis of the data completed
- **CSC**
  - major question: radial or stereo strips?
  - strip comparator ASIC is being simulated, to be submitted in summer, delivered in August
  - strip pattern chip: limited version to be implemented in FPGA before November
- **Track Finder**
  - XILINX chips already programmed
  - shall be placed on boards by late summer

Muon Trigger Software

- **RPC / PACT**
  - PACT simulation package MRPC implemented in CMSIM 100 *(Warsaw)*
- **Drift Tubes / BTI & TC**
  - BTI prototype test data used for simulation of the final chip *(Padova)*
  - simulation software to be moved from CMSIM 008 to CMSIM 100 soon *(Padova)*
- **CSC**
  - MF1/1 test data used to simulate bx id. and half strip resolution algorithms *(Dubna)*
  - stand alone programs used to study bx id., half strip resolution, etc. *(UC Davis, UCLA, OSU)*
  - trigger simulation software is being written *(UC Davis, UCLA, OSU)*
- **Track Finder**
  - simulation software to be moved from CMSIM 008 to CMSIM 100 soon *(Vienna)*
- **Backgrounds**
  - a lot of effort at *CERN, UC Davis, FNAL, Protvino*
  - LHC Background Workshop, 22.03.96, CERN
- **General issues**
  - two muon trigger rates recalculated *(Warsaw)*
  - isolated muon trigger under study *(Madrid)*

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CMS Muon Trigger
Preliminary specifications
of the baseline trigger algorithms

CMS Muon Trigger Group

Abstract

This document contains the specifications of the CMS baseline Muon Trigger algorithms. After listing basic requirements and their justifications the algorithms of all Muon Trigger components are described. List of the technical notes and other documents related to the Muon Trigger simulation and design is appended.

Available at ***/afs/cern.ch/user/w/wrochna/public/html/mtalgol/***
or ***http://cmsdoc.cern.ch/~wrochna/mtalgol/***

Tasks of the CMS Muon Trigger:

- **muon identification**
- **transverse momentum measurement**
- **bunch crossing identification**

Basic requirements:

- **Geometrical coverage: up to $|\eta|=2.4$**
- **Latency: < 3.2 μs**
- **Trigger dead time: not allowed**
- **Maximal output rate: < 15 kHz for luminosities < 10^{34} $s^{-1}cm^{-2}$**
- **Background rejection: trigger rate due to background should not exceed the rate of prompt muons from heavy quark decays**
- **Low p_t reach: should be limited only by muon energy loss in the calorimeters**
- **The highest possible p_t cut: ~50-100 GeV**
- **Isolation: transverse energy E_t deposited in each calorimeter region of $\Delta\phi \times \Delta\eta$ = 0.35 $\times$ 0.35 around a muon is compared with a threshold**
- **Output to the Global Trigger: up to 4 highest p_t muons in each event**

Open questions and problems

- **RPC / Pattern Comparator Trigger (PACT)**
  - physical segmentation
  - data transmission from RPC to PACT
  - neighbour ghost suppression
- **Drift Tubes / Bunch and Track Identifier (BTI) & Track Correlator (TC)**
  - BTI operation in magnetic field
- **Cathode Strip Chambers / wire & strip cards, motherboard**
  - multitrack ambiguities, stereo vs radial strips, RPC or CSC pads, etc
  - data transmission from motherboard to Track Finder (1 or 2 tracks/bx?)
- **Track Finder for DT & CSC**
  - track finding in the barrel/endcap corner
- **Muon Sorter**
  - physical location
- **Global Muon Trigger**
  - matching RPC and DT/CSC information
  - isolated muon trigger